



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/038,556	01/04/2002	Elena M. Shembel	7053-1	7138

27305 7590 12/18/2006
HOWARD & HOWARD ATTORNEYS, P.C.
THE PINEHURST OFFICE CENTER, SUITE #101
39400 WOODWARD AVENUE
BLOOMFIELD HILLS, MI 48304-5151

EXAMINER

DOVE, TRACY MAE

ART UNIT	PAPER NUMBER
----------	--------------

1745

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	12/18/2006	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/038,556

Applicant(s)

SHEMBEL ET AL.

Examiner

Tracy Dove

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 November 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,8-12,15 and 18-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,8-12,15 and 18-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This Office Action is in response to the communication filed on 11/6/06. Applicant's arguments have been considered, but are not persuasive. Claims 1, 8-12, 15 and 18-25 are pending. This Action is FINAL, as necessitated by amendment.

Claims Analysis

Note the specification states lithium batteries having polymer electrolytes are generally configured as gel-type polymer electrolyte which have liquid intermixed with a selected polymer electrolyte matrix material. The polymer electrolyte functions as a separator, being interposed between the cathode and anode films of the battery (page 5, lines 15-18). Thus, the modified polymer material of the present invention functions as a separator.

Note the "polymer electrolyte" of the claimed invention is a two phase material because the claims recite a gel electrolyte (C-PVC is solid polymer electrolyte part and solvent is liquid electrolyte part).

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1, 8-12, 15 and 18-25 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claims 1 and 12 recite "unblended C-PVC", which does not appear to be

Art Unit: 1745

supported by the specification. Furthermore, the specification teaches the resulting modified polymer material is then blended together with at least one salt of an alkali metal and at least one aprotic solvent. A negative limitation must be supported by the specification as filed. The specification does not support the limitation "unblended".

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 8-12, 15 and 18-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Alamgir et al., US 5,252,413 in view of Chang et al., US 5,389,463 and/or in view of Chia et al., US 6,617,078 B1.

Alamgir teaches a lithium battery using lithium ion conductive solid polymer electrolytes composed of solvates of lithium salts immobilized in a solid organic polymer matrix. In particular, lithium batteries using solid polymer electrolytes derived by immobilizing solvates formed between a lithium salt and an aprotic organic solvent(s) in polyvinyl chloride (PVC) are disclosed (abstract). The solid electrolyte comprises 50-90 wt% of the aprotic organic solvent, 5-30 wt% of PVC and 5-15wt% of the lithium salt (col. 4, lines 7-11). Figure 2 depicts results for a Li/LiMn₂O₄ solid polymer electrolyte cell and Figure 3 depicts results for a carbon/ LiMn₂O₄ solid polymer electrolyte cell. The lithium salt may be LiPF₆, LiClO₄, LiAsF₆ or LiPF₆. The solvent may be ethylene carbonate, propylene carbonate or γ -butyrolactone (col. 3, lines 35-65). The negative electrode may contain a carbon material, lithium or a lithium alloy such as lithium-

Art Unit: 1745

aluminum or lithium-tin. The positive electrode may contain MnO_2 , V_6O_{13} , V_2O_5 , lithium manganese oxide, lithium polysulfide, polypyrrole, polythiophene or polyacetylene (col. 4, lines 12-42). Alamgir teaches a typical solid electrolyte comprises an aprotic solvent (propylene carbonate) containing a lithium salt (LiClO_4) immobilized in PVC. The electrolyte has conductivities of $0.9 \times 10^{-3} \text{ ohm}^{-1}\text{cm}^{-1}$ ($0.9 \times 10^{-3} \text{ S/cm}$) at 20°C (2:18-22).

Alamgir does not explicitly state the solid organic polymer matrix (separator) of the solid polymer electrolyte contains chlorinated PVC or a chlorinated PVC having 60-75 wt% chlorine.

However, Chia teaches a lithium ion rechargeable battery having a negative electrode, a positive electrode and a separator/polymer electrolyte there between comprising a chlorinated polymer. The polymer is comprised of a chlorinated polyvinyl chloride (col. 2, lines 10-18). The chlorinated PVC may be used alone or blended with a terpolymer of vinylidene chloride. Chlorinated PVC is a well known commercially available material. Preferably the amount of chlorine is at least 57 percent bound chlorine in the polymer. Chlorinated PVC resins of different molecular weights and chlorine contents are commercially available (col. 3, lines 6-33). The electrolyte comprises a lithium salt dissolved in a mixture of organic solvents. The lithium salt may be LiPF_6 , LiClO_4 , LiAsF_6 , LiPF_6 , and combinations thereof. The solvent may be ethylene carbonate, propylene carbonate, dimethyl carbonate, and combinations thereof (col. 4, lines 51-col. 5, lines 4). See also Example 1. The anode is a lithiated carbon material (col. 3, lines 2-5). The anode may be a carbon-based material and the cathode may be a metal oxide (vanadium pentoxide) or lithium transition metal oxide (lithium manganese oxide) (col. 4, lines 8-20). The cathode comprises the chlorinated polymer.

Furthermore, Chang teaches a polyvinyl halide having a halogen content of at least about 55 wt% of the polymer. The polyvinyl halide may be polyvinyl chloride. The polyvinyl halide can be a post-halogenated polyvinyl halide such as chlorinated polyvinyl chloride (CPVC). The chlorine weight content of the post-halogenated polyvinyl halide should be at least about 60%, with greater than 65% being preferred (col. 4, lines 40-col. 5, lines 15).

Therefore, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because one of skill would have been motivated to substitute the chlorinated PVC of Chia or Chang for the PVC of Alamgir in order to improve the properties of the battery. The use of chlorinated PVC shows enhanced high temperature stability of the battery and mechanical integrity of the separator/polymer (Chia; col. 3, lines 6-33). Chang teaches chlorinated PVC has high tensile strength and ductility (col. 3, lines 9-25). Alamgir, Chia and Chang all teach PVC materials for the separator/polymer matrix of a battery. Chia teaches that chlorinated PVC is a well known commercially available material for a battery separator/polymer matrix with different molecular weights and chlorine contents available. Chang teaches post-chlorinated PVC is a known material for use as a battery separator. Thus, one of skill would have found it obvious to substitute chlorinated PVC for the PVC of Alamgir because Chia and Chang teach chlorinated PVC is a well known battery separator/polymer matrix material.

Regarding the chlorine content of the chlorinated PVC, Chang teaches the chlorine weight content of the post-halogenated polyvinyl halide should be at least about 60%, with greater than 65% being preferred. Chia teaches chlorinated PVC with an amount of chlorine of

Art Unit: 1745

at least 57 percent and chlorinated PVC resins of different molecular weights and chlorine contents are commercially available.

Response to Arguments

Applicant's arguments filed 11/6/06 have been fully considered but they are not persuasive.

35 U.S.C. 103(a)

Applicant asserts there is no motivation or suggestion that substituting chlorinated PVC into the non-chlorinated formulations taught by Alamgir would even be functional, let alone desirable. However, Applicant provides no rational or evidence to support this assertion. The Examiner has provided motivation for combining, which Applicant has not addressed. Furthermore, a teaching in the art that chlorinated PVC is a well known commercially available material for a battery separator/polymer matrix with different molecular weights and chlorine contents available (Chia) and post-chlorinated PVC is a known material for use as a battery separator (Chang) at least suggests the use of chlorinated PVC for the PVC of Alamgir.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Applicant argues Alamgir is silent regarding a solid polymer electrolyte containing chlorinated PVC having 60-72 wt% chlorine and neither Chang nor Chia cure the deficiencies in the teachings of Alamgir. Examiner disagrees. See obvious rejection and motivation statement provided above. Applicant has not addressed the motivation for combining provided by the Examiner.

Art Unit: 1745

Applicant argues Chia discloses blends of chlorinated polymer are highly preferred over using chlorinated PVC alone. However, Chia teaches using chlorinated PVC alone. Chia is not limited to any preferred embodiment. Applicant argues Chang discloses chlorinated PVC can be blended with other chlorinated polymers. However, Chang is not limited to any particular embodiment. Chang teaches chlorinated PVC can be optionally blended with other chlorinated polymers.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tracy Dove whose telephone number is 571-272-1285. The examiner can normally be reached on Monday-Thursday (9:00-7:30).

Art Unit: 1745

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

December 13, 2006



TRACY DOVE
PRIMARY EXAMINER